Automatic acquisition of cell lineage through 4D microscopy and analysis of early C. elegans embryogenesis

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C. elegans is the simplest multicellular organism that has been extensively studied in the molecular biology. C. elegans is also the most advanced multicellular organism in genomics - genome sequencing has finished and a wide variety of post genome-sequencing projects are strongly undertaken, such as genome-wide gene-knockouting by mutagenesis or RNAi, and EST and gene expression pattern analysis. Thus, a huge number of data have ac-cumulated and are accumulating for this organism. Currently, most of those data are qualitative observations. In addition to those qualitative data, a number of quantitative data and sophisticated computer simulation techniques are necessary for the system level understanding. In this talk, I will report on the development of our automatic cell lineage extraction system.

With this system, a variety of quantitative data, such as the timing of cell divisions and x, y, z, position of nucleus at each time point, are obtained for gene-knockouting animals. I will further report on our computer simulation systems and analysis of very early period of C. elegans embryogenesis.